

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P06481PC00	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/EP2004/014669	International filing date ( <i>day/month/year</i> ) 23.12.2004	Priority date ( <i>day/month/year</i> ) 30.12.2003	
International Patent Classification (IPC) or national classification and IPC INV. H04L25/03			
Applicant TELEFONAKTIEBOLAGET LM ERICSSON (PUBL) et al			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 6 sheets, as follows:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the report</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>			
Date of submission of the demand 28.10.2005	Date of completion of this report 11.04.2006		
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Mier, A Telephone No. +49 89 2399-7100		



# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/EP2004/014669

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

### Description, Pages

1-23	as originally filed
4b	filed with telefax on 28.10.2005

### Claims, Numbers

1-23	filed with telefax on 28.10.2005
------	----------------------------------

### Drawings, Sheets

1/7-7/7	as originally filed
---------	---------------------

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3.  The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
- the claims, Nos.
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/014669

---

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

**1. Statement**

Novelty (N)	Yes:	Claims	1-23
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-23
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)

International application No.

PCT/EP2004/014669

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following document:

D4: WO 99/57820 A (ARRAYCOMM, INC) 11 November 1999 (1999-11-11)

1. **Novelty:**

The document D4 is regarded as being the closest prior art to the subject-matter of claim 1, and shows a method for calibrating a communication system having an antenna array comprising:

- the subscriber unit transmits a first uplink calibration burst or bursts so that the base station can estimate the uplink channel
- the base station transmits a first downlink calibration burst (or bursts) so that the subscriber station can estimate the downlink channel
- "uplink signature" and "downlink signatures" are estimated as e.g. a vector of transfer functions
- uplink and downlink signatures are used to determine a calibration function to account for differences in the apparatus chains, and that enable downlink antenna processing weights to be determined.

The subject-matter of claim 1 differs from this known D4 substantially in that

- i. a second type of pilots is used in addition to the existing common pilot channel  $P_c$  to estimate a correction vector

3<sup>rd</sup> embodiment -> especial estimation symbols (or pilot channel)  $P_s$

4<sup>th</sup> embodiment -> known symbols that are sometimes referred to as dedicated pilot channel  $P_d$

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/EP2004/014669

**2. Inventive step:**

The problem to be solved by the present invention may therefore be regarded as that of providing a method for achieving an improved estimate of the channel, which characterise the complete transmitter-air interface-receiver chain, whereby ensuring reciprocity of the bidirectional communication channel.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

by means of the above mentioned feature i., the channel estimate  $H'_{B \rightarrow A}$  is also known in the second node, which uses both  $H'_{B \rightarrow A}$  and the already known channel estimate  $H_{A \rightarrow B}$  (determined by means of the common pilot channel) to calculate a correction vector.

Claims 2-16 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**3. Other independent claims:**

The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent (apparatus) claim 17, which therefore is also considered new and inventive.

IAP11 Rec'd PCT/PTO 29 JUN 2006

4 b

WO 99/57820 discloses a method of calibrating mainly the transmitting and receiving parts of a basestation to achieve reciprocity in the uplink and downlink communication. Also the electronics in the transmitting and receiving parts of a subscriber unit may be accounted for, giving calibrations of basestation – subscriber unit pairs. The method according to WO

- 5 99/57820 comprises of transmitting a calibration bursts from basestation to a subscriber unit and from the subscriber unit to the basestation, determining “downlink signature estimate” and/or “downlink signature estimates” based on the calibration burst(s) and sending the “downlink signature estimate” to the base station, which uses the signature estimate(s) to calibrate its transmission-receiving chain to achieve reciprocity.

10